



Original Article

International Institutions and the Rise of Asia

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Abstract

This article applies a game-theoretical analysis of institutions to the international institutional architecture, of which the G20 is treated as a central element. The article argues that international institutions such as the World Trade Organization or the International Monetary Fund are best understood as mechanisms for coordinating and supporting equilibria in repeated games played among policy-makers in the world's largest economies. The growth of the emerging economies, particularly in Asia, has altered these games, and there is no guarantee, with these new entrants and new issues that have emerged, that the old equilibrium strategies are still viable. The G20, it is argued, is best understood as an attempt to respond to this change and coordinate play on a new set of globally welfare-enhancing equilibria in these games.

Key words: International economic cooperation, G20, Asia, institutions, game theory

1. Introduction

The past three quarters of a century has seen the growth and development of a set of what might be termed international economic institutions—the Bretton Woods institutions, the G7 and more recently the G20. The function of these institutions is, loosely speaking, to encourage and support economic policies at the national level that will lead to greater welfare globally than if policies were chosen in isolation. There is little about these institutions, however, that has been entirely without controversy. The way countries are chosen for inclusion in different groups, their governance, the choice of agenda priorities are among some of the areas that occasion most debate.

The past two decades have also seen development of the study of institutions within economics—what they are, why and how they evolve and how they are sustained. These theoretical advances have been fruitfully applied to explain the workings of various formal and informal institutions, especially in the context of economic development. Yet no serious effort has, to our knowledge, been made to apply these theories to the study of international economic institutions. This is surprising given the debates that surround the modalities and the effectiveness of international institutions. Older work, including in the analysis in the lead up to the establishment of what became the Asia Pacific Economic Cooperation (APEC) process (Drysdale 1988), pre-dates and anticipates the development of this more recent theory. A clearer understanding of what an institution is, how it operates, and of

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what it can and cannot do, would appear to be an essential prerequisite to understanding the purpose and value of international institutions, especially those that are breaking new ground.

This article aims to go a way towards overcoming this deficiency. Specifically, its intention is to use the game-theoretical analysis of institutions developed in institutional economics to better understand the nature and role of the various elements of the international institutional architecture, with the emergence of the G20 at the centre of interest. It is argued that the advantage of a game-theoretical approach is that it focuses attention on the pre-institutional games played between policy-makers and identifies what equilibria exist in these games. This in turn makes it clear where international institutions might play a role in coordinating play on Pareto-superior equilibria, and where this is less likely to be possible. Understanding current policy-making games is particularly pressing, it will be argued, as the rapid growth of Asian economies over the past two decades represents a shock to play in these games and raises questions about changes in the structure of the current international institutional architecture.

The article is structured as follows. The next section reviews the main elements of the game-theoretic study of institutions and provides an example of how this approach may fruitfully be applied to the study of international institutions by considering the case of trade and the World Trade Organization (WTO). This forms the backdrop to the discussion, in the third section, of the G20's specific role in the international institutional architecture. The understanding of the role and nature of the G20 aims to inform the discussion, in a fourth section, of the activities to date of international institutions and the G20 in coordinating policy and the proposal of certain future avenues for action. A fifth section concludes.

2. Game Theory and International Institutions

The rational choice study of institutions can be divided into two complementary

approaches.² The first views institutions as 'the rules of the game in a society, or more formally, the humanly devised constraints that shape human interaction' (North 1990, p. 3). Such rules are divided into formal rules, including the law, and informal rules or norms. Since institutions are, according to this view, analogous to the various technological constraints subject to which economic agents make decisions, much work within this paradigm is directed at studying the selection, and the efficiency, of different institutions. Some have focused on political competition in the selection of institutions (Olson 1982), while others have argued for a form of natural selection; over time, more efficient forms of institutional organisation will outperform others and replace them (Williamson 2000; Binmore 2005).

In identifying institutions and rules, this approach draws out two salient features of an institution. First, an institution is associated with a behavioural regularity, one that might not be expected if individuals were simply maximising utility from material circumstances, subject only to technological constraints. Second, just as rules of a game are known to all the players of a game, agents generally know reliably what institutions exist in their society and how individuals will behave in the context of these institutions' existing.

However, identifying rules with institutions, while treating the enforcement of such rules as exogenous, fails to explain why such regularities of behaviour persist or why rules are even taken seriously in the first place. For a behavioural regularity to emerge and persist, it must be consistent with the incentives agents face in their relevant social interactions. Defining institutions as rules, which agents simply follow, obscures this. The second approach therefore starts out from a description of social interactions as games, making explicit the strategic interdependence between agents and the mechanisms by which behavioural regularities

2. For a more detailed review of both approaches, see Greif and Kingston (2011).

are enforced. Any regularity that arises must be part of equilibrium of the game under study.

A particularly important result in this respect is the Folk Theorem. This states, in essence, that in an indefinitely repeated game played by sufficiently patient players, any strategy profile for the repeated game that yields average discounted per-period payoffs that are a Pareto improvement on a Nash Equilibrium of the one-shot game can be achieved as a sub-game perfect Nash Equilibrium.³ Since the kinds of social interactions in which institutions operate are repeated, the Folk Theorem allows us to reconcile the requirement that behavioural regularities associated with institutions must be self-enforcing and the fact that many institutions lead to behavioural regularities that appear inconsistent with individual incentives, at least in single interactions. One important limitation of the various folk theorems, however, is that they do not single out which of the often large number of equilibria in the repeated game will arise in actual play.

While the second approach is unified in understanding institutions and behavioural regularities as equilibrium phenomena, there are different understandings of what an institution is. At one extreme, Calvert (1995) has argued that an institution is nothing more than a description of the aggregate behavioural regularity that arises in equilibrium in certain kinds of interactions. Tempering this view, Greif (2006) focuses on the role of certain 'institutional elements' in helping coordinate agents' expectations of other agents' play in social interactions. We tend towards the latter view—institutions are created to help overcome the coordination problem created by the fact that the Folk Theorem does not single out one of the potentially infinite number of equilibria that are possible for a given repeated game.

The game-theoretical understanding of institutions thus provides a clear approach to

studying a given institution as described by Greif and Kingston (2011). The analysis starts from a description of an underlying repeated game. This description should, if possible, only include the primitive situation in which the players find themselves, setting out the technological and informational constraints in the circumstances under study. Once this primitive situation has been described, and possible equilibria identified, the various institutions and other social constructs (jointly referred to as 'institutional elements' in Greif's language) that exist to help coordinate on a particular equilibrium, guide the formation of expectations or even alter the payoffs of the underlying game can in turn be studied with reference to the original game.⁴

In considering international institutions, then, the first step is to identify the underlying games in the context of which such institutions arise. The games that will be of interest are policy-making games—games where policy-makers of different countries must set domestic policies in a context where their optimal policies depend on the policies chosen by policy-makers in other countries. One major area of policy-making will presently be examined in this connection, to illustrate how the analysis is to be conducted, namely trade policy. Two further areas, macroeconomic policy (fiscal and monetary policy) and climate change policy will be discussed further below, in relation to the G20.⁵ Within the present conceptual framework, international policy cooperation is then understood as the attempt to move to Pareto-superior equilibria in the repeated policy-making games, often through the creation and use of international institutions to alter national policy-makers' expectations about how their colleagues in other countries will play in future rounds of the game.

3. This is roughly the original version of the theorem presented in Friedman (1971), while more sophisticated versions (for example, Kandori 1992) allow for such complications as changing partners over time and imperfect information.

4. For a detailed example of such an analysis, see Greif's (2006) discussion of the 'fundamental problem of exchange'.

5. Other areas of policy-making could readily be identified, for example the regulation of financial markets, or domestic tax policy, but they are not considered here, as they present similar features to the three on which we shall focus in the article.

The strategic nature of trade policy, in particular the setting of tariffs, has long been recognised. The formal nature of the one-shot games being played by policy-makers has been studied extensively, and is akin to an elaborate prisoners' dilemma. A basic version of this interdependence arises when there is imperfect international competition, and policy-makers set tariffs to maximise domestic aggregate surplus. In this kind of set-up, all countries will impose positive tariffs, above the socially optimal level of the tariff.⁶ This interdependence has also long been recognised by policy-makers, if more informally. For this reason, trade policy was one object of the first major effort at international institution building, the Bretton Woods institutions, which were established as a result of American and European policy-makers' conviction that a lack of international policy coordination in the 1930s helped deepen the great depression (Steil 2013). In the area of trade, this institution building took the form of the General Agreement on Tariffs and Trade (GATT), later replaced by the WTO.

Within the context of the prisoners' dilemma-type games frequently analysed in international trade, it might be tempting to think of the WTO, or the GATT before it, as performing a role analogous to the one which might be attributed to the police and judiciary within a society, namely changing the incentives faced by players so that the outcome of the prisoners' dilemma that is Pareto superior to the Nash equilibrium becomes an equilibrium. This view would be mistaken, as it does not explain how the change in incentives that is supposedly brought about is enforced.

Instead, the Folk Theorem provides the key to understanding the role of the WTO within the larger international regime that is the liberal international trade regime. The game of setting trade policy neatly satisfies almost all the requirements of the Folk Theorem. Interactions are certainly repeated, and the game can safely be treated as continuing indefinitely. Past actions (setting or refraining from sett-

ing tariffs) are readily observable. The only requirement whose satisfaction might be open to debate is that agents, in this case, policy-makers, are sufficiently patient. The fact that a large degree of tariff liberalisation has been possible over the past half-century suggests, however, that this requirement is at least partially satisfied. The Folk Theorem thus guarantees that it is possible for policy-makers in different countries to choose a strategy over time where they will set tariffs at the Pareto-optimal level (that is, low or no tariffs) but punish countries that defect from the low-tariff situation by retaliating and, for a time, setting punitive tariffs against defectors.

It is noteworthy that this kind of strategy almost exactly describes the way in which defections from WTO liberalisation agreements are treated under the WTO system. Countries may bring a complaint under the WTO's dispute resolution mechanism. If the policy that is the object of the complaint is found to violate an existing WTO agreement, the complainant is entitled to retaliate, in particular through the use of punitive tariffs or other measures. It is this retaliation, or the implicit threat of it, carried out by the WTO's members themselves, that supports WTO agreements.

Two different WTO disputes illustrate this line of reasoning. The first is the 30 per cent tariff imposed by the US government on steel products in March 2002 (DS248). The threat of retaliatory measures from in particular the European Union (EU), following a WTO ruling that the tariffs violated WTO agreements, led the US government to remove the tariffs by December 2003. Contrast this with the case of US subsidies to cotton farmers, which were first the object of WTO proceedings engaged by Brazil in September 2002 (DS268). After finding in Brazil's favour, the WTO gave Brazil the right to retaliate in November 2009. Yet, at the time of writing, Brazil has not taken any retaliatory measures, so the dispute remains unsettled. The difference between these two situations lies not with the WTO, which acted in the same manner, but with the complainant countries. The willingness and ability of countries whose producers

6. McMillan (1986) provides a detailed review of early applications of game theory to international trade.

are the object of discriminatory trade measures to retaliate in a meaningful way is what fundamentally supports liberal trade rather than the WTO acting independently.

The role of the WTO as an institution is instead to be found elsewhere. In light of the multiplicity of equilibria that exist in the repeated game, the most important role of the WTO is as a coordination device. The existence of a WTO agreement, complete with specifications of the kind of actions that will be carried out if the agreement is breached, supports the formation of expectations for policy-makers that they will be setting policy in a context in which they can be confident that liberal trade policies are prevalent and illiberal trade policies will be punished. The negotiation of new WTO agreements also supports the change from equilibria in which certain goods are protected, to others, in which they are not.

The second role of the WTO, and of its dispute resolution body in particular, is to make equilibria more stable. Given the fact that WTO agreements allow for the imposition of trade-restricting measures, under certain conditions, there is potential for liberal-trade equilibria to unravel if policy-makers in different countries, the players of the game, take different views on whether new trade-restrictive policies are justified or not. This might be thought of as the policy-makers having differing information on whether violations of agreements have taken place. The dispute resolution body thus effectively makes it common knowledge to the players whether or not a given restrictive policy is a violation of existing agreements.

Trade policy arguably represents the area of international policy-making where the greatest success has been had in moving from an inefficient equilibrium—generalised protectionism—to a more-efficient one—the current (relatively) liberal international trade regime. The WTO, and the GATT before it, has played an important role in this transition and in the maintenance of the current regime. As discussed in greater detail below, the regime is currently under some challenge, as new (in the sense of newly significant) players have joined

the game and new issues that connect commodity trade to services trade and investment have emerged. But its past gains have so far remained well entrenched.

3. The G20 in the International Institutional Architecture

In the above analysis, we have identified an international institution, the WTO, whose principal role is to coordinate expectations in a repeated international policy-making game so that national policy-makers play the strategies associated with an equilibrium that is Pareto superior to at least some other possible equilibria. We see a similar pattern in other international policy-making games: the International Monetary Fund (IMF) in the macro-economic policy game and the United Nations Framework Convention on Climate Change (UNFCCC) in the climate policy game, as discussed later. What role does this leave for an institution that purports to cover all these areas of policy-making at the same time?

The genesis of the G20 is a tale of two crises. The first—the Asian financial crisis—led to the creation of the G20 as a meeting of finance ministers and central bank governors from 19 of the world's largest economies plus the EU. The second—the global financial crisis—led then-US president George W. Bush to elevate the G20 to a leaders' level meeting. This decision was accompanied by claims that the G20 had replaced the G7 and was now the pre-eminent forum for international economic policy coordination.

Bush's hand was forced by the dire circumstances in which the global economy found itself in 2008. Consequently, the work of the early G20 summits largely focused on averting a deeper crisis, as opposed to international institution building in the context of the types of repeated games of interest here. But the creation of the G20 is also the product of longer term trends in the global economy. If Bush had not elevated the G20 to the level of a leaders' forum in 2008, something similar may well have been created in the following decade.

The old international institutions—the WTO, the IMF, even the UNFCCC—were all developed at a time when the world's largest economies were, with the exception of Japan, European and North American. By 2008, the G7 economies represented only 41 per cent of the global economy, expressed at purchasing power parity, as compared with 56 per cent in 1980 (IMF 2012a). The declining share of the G7 economies was primarily the consequence of the extraordinary rise of Asia over the past three decades. China alone grew from 2 per cent of the global output to 12 per cent over the same period. By 2012, China already was nudging a 15 per cent share in world output and will grow in importance over the years ahead, a success mirrored or being mirrored, in the growth of South Korea, India and Indonesia among other Asian economies.

The G20, on the other hand, represents 83 per cent of the global economy at purchasing power parity (IMF 2012a), and 80 per cent of world trade (IMF 2012b) at the time of writing. In particular, the Asian G20 members⁷ represented 30 per cent of world output and 23 per cent of world trade in 2012 (IMF 2012b). They held 46 per cent of total global currency reserves in 2010 (World Bank 2012), and Asia as a whole produced 35 per cent of global output, as measured at purchasing power parity, as compared with just under 20 per cent in 1980 (IMF 2012a).⁸

The rapid growth of the Asian economies is best understood as an exogenous shock in the repeated policy-making games identified above. Specifically, when the Asian countries' economies were small, they could only respond to policy choices made in large economies, as is still the case in smaller economies, developed or otherwise, today. Trade or macroeconomic policy in these developing economies has little effect on the developed economies; so, from the perspective of policy-makers in the largest developed economies at least, there was no strategic interaction between themselves and the developing economies, and thus little need

to closely involve the developing economies in efforts to coordinate expectations through various international institutions.

This is no longer the case, and policy in large emerging economies is relevant, and will become more relevant, to policy-makers in advanced economies. However, at least in the kinds of policy-making games considered in this article, the large emerging economies are not so different from the developed economies. They often have the same policy options and these often yield more or less the same payoffs as for the advanced economies. In trade, for example, the same protectionist tools are available to emerging economies' policy-makers as to policy-makers in developed ones, and qualitatively similar payoffs will follow from using them or refraining from doing so. Likewise, policy-makers in emerging economies like those in advanced economies often face the same domestic tradeoffs in deciding whether to support their currencies or not, or whether to embark on expansionary fiscal policy or not.

One might therefore expect the coordination devices in the old international institutions to continue to function equally well as new players with similar payoffs enter the policy-making games. There is a view in emerging economies, however, that these coordination devices have tended to coordinate policy to the advantage of the advanced countries, and the disadvantage of developing ones. There is even a view in some emerging economies that advanced economies will not stick to policy strategies that will see their relative economic importance decline over time. This belief helps explain, for example, Chinese cynicism about US motives in promoting the Trans-Pacific Partnership (George Mulgan 2013) at the expense of the WTO. Emerging-economy scepticism is not limited to trade, and affects all the types of policy-making games mentioned above.

On top of changes in players, the games themselves have changed with time. There are new elements in the trade game, for example, such as the interaction between trade in services, direct foreign investment and goods trade. However, there has been no effort to date

7. Australia, China, India, Indonesia, Japan and Korea.

8. Here, Asia is defined as ASEAN + 6 as well as Taiwan and Pakistan.

to coordinate play in national policy-making in these new parts of the trade game on optimal equilibria; bilateral and multilateral treaties have been the principal determinant of the environment for international investment. Likewise, in the macroeconomic coordination game, high levels of financial intermediation and risk management, accompanying the growth of capital flows and the disappearance of barriers to international capital mobility, are a new source of potential macroeconomic instability, and policies to govern this in an internationally optimal way need to be negotiated among developed as well as developing economies.

The G20, by bringing the most important emerging economies into the fold is thus best thought of as an attempt to address these two weaknesses in all the traditional coordination devices simultaneously.

For this reason something like the G20 would eventually have been needed, even if it had not been created when it was. As new players enter international policy coordination games and new issues affect the structure of the games, there is a danger that old equilibria will unravel, before play in the new expanded games eventually converges on equilibria that are Pareto inferior to the equilibria in the old games. The G20 therefore aims to rehabilitate the old institutions in the eyes of new players in the game and reform these institutions as necessary, so that they can continue to play their role in coordinating and supporting equilibria. This is particularly important if it turns out that the arrival of new players or the emergence of new issues does in fact change the policy games in such a way that old equilibria can no longer be stable and self-enforcing. In this event, as policy-makers in the world's largest economies attempt to coordinate on new equilibria through the G20 and the other international institutions, it will be important to remember that it will still only be possible to move from inefficient equilibria in repeated prisoners' dilemma-like games to Pareto-superior ones when the conditions of the Folk Theorem hold, which in turn depends on the players and the primitive game being played.

4. What Has the G20 Done and What Is to Be Done?

With this understanding of the nature of international institutions, and of the G20 in particular, it is now possible to evaluate the role of the G20 and the priority that might attach to some of the proposals for the G20's immediate agenda.

4.1 *Macroeconomic Policy Coordination and the Recovery*

The first and, to this day still, most important task of the G20 is resolving the financial crisis and its economic consequences—particularly the widening gap between capacity and effective demand, which has created an ongoing risk of deflation and depression—and eliminating the conditions that caused the crisis.⁹ Much of the G20's efforts to resolve the crisis have therefore focused on international coordination of macroeconomic policies.

Macroeconomic policy-making presents many of the same prisoners' dilemma-like features as trade policy; yet engineering a successful transition to more efficient and stable international institutions is much harder. The fact that monetary and fiscal policy settings in one country affect optimal monetary and fiscal policy settings in other countries is a basic result of open-economy macroeconomics. Just as in the case of trade, this interdependence has many of the characteristics of a prisoners' dilemma, and the recognition of this type of interdependence lay behind the creation of another of the Bretton Woods institutions, the IMF. While the IMF's original purpose was more limited—helping to preserve exchange-rate stability—since the collapse of the dollar standard it has more overtly moved into the coordination of macroeconomic policies generally.

Notwithstanding the existence of the IMF and its goal of bringing about and supporting an international environment in which Pareto-superior macroeconomic policies are

9. For a more detailed review of the achievements of the G20 to date, see Pisani-Ferry (2011).

followed, such policies have only partly prevailed. One notable failure in recent times has been the debate over external imbalances, importantly between the United States and East Asia, and between northern Europe and southern Europe. These imbalances can be seen as resulting from domestic macroeconomic policies, and the IMF has been largely powerless to stop them.

The G20 has met with some success in reducing the partly policy-induced macroeconomic imbalances that were associated with the onset of the crisis. Notable successes in this area was the Pittsburgh summit's *Framework for Strong and Sustainable Growth*, which includes the Mutual Assessment Process and the system of action plans that subsequent summits have produced, and the agreement at the Toronto summit on deficit reduction targets to be reached by 2013, and target debt to gross domestic product ratios for 2016. These measures need a common approach to measuring progress of macroeconomic policies against previous commitments, taking changing economic circumstances into account, if they are to be taken seriously. The Los Cabos *Accountability Assessment Framework* is a step in this direction, but only a step. What reductions in imbalances that have taken place—as between China and the United States—appear more the result of changing external economic circumstances than of any deliberate policy intervention.

To understand the relative failure of international policy cooperation in this area, one needs to again relate the underlying game to the Folk Theorem. Given that the conditions for the theorem to hold appear again to be satisfied—past actions are observable, the probability of the game ending soon is sufficiently low, the players are likely to be at least somewhat patient—the reasons for failure must therefore be sought elsewhere. What appears to be missing in this context is a comprehensive system for punishing deviations from cooperative policy setting, comparable to the WTO's dispute resolution body. As with the WTO's dispute resolution mechanism, to be effective, the punishment needs to be carried out by countries themselves.

To illustrate this point, consider Atlanta Fed President Dennis Lockhart's recent comments on the international dimension of US monetary policy-making:

You have to remember that we are a legal creature of Congress and that we only have a mandate to concern ourselves with the interest of the United States. Other countries simply have to take that as a reality and adjust to us if that's something important for their economies. (Bloomberg 2013)

These comments do not imply that US monetary policy-makers take no account of the effect of US monetary policy in other countries. However, they only take into account those effects that in turn matter for the US economy. Such feedback effects might be purely mechanical: a tightening, say, of US monetary policy might lead to a reduction in capital flows to emerging economies and, consequently, weaker demand for US exports in these economies. If such general equilibrium effects were sufficiently strong, then US policy-makers would factor it into their deliberations on when to taper quantitative easing.

Yet such feedback could also arise from a conscious decision of monetary policy-makers in other countries affected by the Fed's policy-making, if other countries linked their own monetary policy stance to whether the United States has avoided imposing large costs on them in its monetary policy setting. Thus, the Fed would consider the effects of US monetary policy on other countries, even if there were no mechanical, general equilibrium effects for the US economy.

The effectiveness of such an approach would depend on two things. First, it would require that monetary policy in the countries concerned have a sufficiently large effect on the US economy. Given the large trade and investment flows between the United States and the economies of the world's next most important currencies—the Euro, the Yen and increasingly the Renminbi—this condition is probably satisfied. Second, it would require that other economies be willing, at least in part, to use their monetary policy to enforce

cooperative behaviour in monetary policy setting between each other.

This is perhaps the problem—given the large and indiscriminate effects of macroeconomic policy changes, governments and central banks are understandably reticent about using macroeconomic policy to punish other countries and their policy-makers. In game-theoretical terms, the punishments used to support the liberal trade regime, given the more targeted nature of trade measures, could conceivably dominate liberal trade policy, from the policy-maker's perspective, in the one-shot game. It is not clear that this is always the case when it comes to retaliatory variations in the money supply or government spending. Yet a way for countries to retaliate in the face of deviations from agreements to cooperate is needed if a cooperative equilibrium can exist in the repeated game. An international institution that, like the IMF, purports to guarantee coordination of macroeconomic policies can only coordinate expectations to engineer a shift to a new equilibrium, and sustain this equilibrium. It cannot create an equilibrium that did not already exist without it.

The G20 has certainly made some progress in reforming the international financial institutions to make them more representative of the changing global economy and, thereby, better able to fulfill their role in coordinating policy-makers on globally optimal equilibria in policy-making games. The Financial Stability Forum has had its membership enlarged, becoming the Financial Stability Board. An agreement has also been reached on reform of IMF quotas, but this reform has not yet been properly implemented. US recalcitrance on this matter is yet to be overcome, and the leaders' optimistic pledge at Los Cabos that it would be passed in time for the Fund's 2012 spring meetings was not honoured. But the larger problem is still yet to be addressed, and until the G20 can find acceptable punishment strategies that allow countries to mutually enforce Pareto-optimal equilibria in the macroeconomic policy coordination game, macroeconomic policy will remain fundamentally uncoordinated.

4.2 *Infrastructure Investment and the Recovery*

At the time of the Seoul summit, the feeling was that the worst of the crisis had passed and the world could now turn to addressing less pressing but important problems, such as underdevelopment or food and energy security. Since then, first the Euro crisis and then civil war in Syria have overtaken the G20, which finds itself both straddled with an ambitious development agenda, set out in the Seoul multi-year action plan and still faced with a major international crisis which cries out for a coordinated solution. The G20 needs to prove itself up to managing the crisis by returning its focus to international economic policy coordination to be able to persuade the global community that it can bring a conclusive end to the current crisis.

Returning government budgets to surplus and waiting for structural reforms to eliminate disequilibria will take many years, and will take longer the lower growth is in the short run. And while emerging economies in Asia and elsewhere have held up reasonably well during the crisis, it is clear that these economies will suffer too if advanced economies do not resume more rapid growth. The current outlook for China is more uncertain than it was, Indonesia's growth is slowing and growth in India is quite weak. There is need for reinforcing confidence via a concerted stimulus to the global economy, and the G20 is the place through which this can happen. Five years of crisis mean that fiscal and monetary stimulus is no longer possible to sustain for many G20 members, so another source of short-term economic growth is needed.

Emerging economies are in a position to increase domestic demand by investing a greater part of their large savings at home rather than abroad. The emphasis thus far has been on expanding consumption. But investing in infrastructure also presents a productive opportunity for doing this (Elek 2011a). There is a special opportunity to mobilise funds and encourage structural reform to facilitate infrastructure investment through the Asian Infrastructure Investment Bank that China has

proposed. This multi-pronged approach will generate the needed synergies for greater long-term jobs growth (Derviş and Drysdale 2014, ch. 13).

The need for better infrastructure in emerging Asian countries is undeniable. With booming populations in some countries (India, Indonesia) and rapid urbanisation in all of them, particularly China, existing infrastructure is inadequate. The Asian Development Bank (ADB) has estimated that approximately \$8 trillion is needed in national infrastructure in Asia between 2010 and 2020 alone (Asian Development Bank 2009). This estimate does not take account of the large demand for trans-national infrastructure within the region and on the drawing boards in regional agencies.¹⁰ The estimate of Asian infrastructure requirements stands next to the Organisation for Economic Co-operation and Development (OECD)'s estimate that global infrastructure requirements over the next two decades will be around \$50 trillion (OECD 2011), highlighting the importance of Asia in global infrastructure demand.

There is a particular need for trans-border regional infrastructure projects to connect the disparate Asian economies. This will deepen economic integration between rapidly growing proximate economies and extend regional production networks, allowing poorer countries in the region to benefit more from the region's booming economies. The ADB (2009) has estimated that \$290 billion in spending is needed on regional infrastructure projects on top of the already identified national projects. The most pressing focus is on connecting the different Asian subregions, improving overland and sea links between South Asia, East Asia and Southeast Asia. The importance of these links is at the heart of Association of Southeast Asian Nations (ASEAN)'s *Master Plan on ASEAN Connectivity* and recent work of the Economic Research Institute for ASEAN and East Asia (ERIA), which has identified \$390 billion of prospective projects which would improve these links (ERIA 2010).

10. See the list of prospective projects in ERIA (2010).

Not only would investing in infrastructure stimulate activity in emerging economies, but the long-run benefits would be large. The ratio of capital to output in countries like China is low (Elek 2011a), so the returns from investing in infrastructure, the increase in productivity of other factors of production and the increase in output resulting from such investment, will all therefore be high. Lower transport costs across Asia and further integration of the Asian economy will lead to further increases in Asian output and growth.

Investing in infrastructure would also provide a much-needed stimulus to developed economies, one their governments are not currently in a position to deliver. The reasons for this are discussed and reviewed by Lin and Dömeland (2012), who estimate that 35 per cent of investment expenditure in developing economies goes towards capital goods imported from advanced economies. These imports largely consist of manufactured goods. Given that the manufacturing sector in advanced economies has been deeply affected by the current crisis, there is spare capacity in this sector to absorb an increase in demand from emerging economies, so an increase in demand will lead to little crowding-out of existing activity.

Infrastructure investment in emerging economies is therefore an ideal global stimulus. It will lead to little crowding-out of existing or planned private activity in emerging and developed economies, not only stimulating activity in emerging economies in the short run but also increasing their output in the long-run too, as well as lifting capacity utilisation in industrial economies.

In spite of the high social returns, there is a shortage of private finance available for investment in infrastructure projects. Classic distortions in goods and factor markets in emerging economies are the first impediment to a better allocation of savings. Fuel subsidies, corrupt government officials, government monopolies and the like all lower the private return from investing in infrastructure well below the social return.

The second impediment is the underdeveloped nature of capital markets in emerging

Asia. Much of the large savings of these economies are intermediated through state-owned banks, as in China, where they are not always subject to market disciplines, or through financial institutions in advanced economies, which are shy about investing in emerging economies. The result of this is that Asian savings end up fuelling the deficits of advanced economies (Elek 2011b). In 2011, the ratio of debt to equity in China's foreign assets stood at 8.2, India's was at 2.6 and Indonesia's was 3.4. This compared with a ratio of 0.7 for Australia or 0.9 for New Zealand (Lane 2013).

This leads to the third impediment, namely that infrastructure projects in emerging economies are not always attractive investments for financiers, even when the returns are high. Physical infrastructure is a very illiquid asset, and returns take time to come. Investors are also turned away by perceived risks in emerging economies stemming from poor regulation, governance or macroeconomic policies. While these impediments make for a powerful and stifling combination, they are problems that can all be fixed.

Although the reforms needed to overcome the impediments to expanded infrastructure investment in emerging economies are largely domestic, the G20 needs to make them its concern for the sake of the global economy. There is a complement between prosecuting this agenda regionally (in APEC) and in the G20 (Derviş and Drysdale 2014, ch. 13). The stimulus from increased demand for exports of capital goods from advanced economies is just what the world economy needs to ride out the difficult process of structural adjustment in Europe and in the United States (Elek 2012). Finding an alternative use for emerging economies' savings is also an integral part of the G20's task of rebalancing the global economy. In the context of the *modus operandi* of the G20 discussed above, where officials of different countries share policy experience, officials from advanced economies would have much to contribute to help emerging economies remove the impediments to more market-based investment in infrastructure.

Some good work has been done through the G20 to promote infrastructure investment, but

not enough. The multi-year action plan on development agreed to at the Seoul summit saw the creation of a high-level panel on infrastructure, made up of businessmen and private financiers. They collaborated with a working group from the multilateral development banks to '[overcome] obstacles to infrastructure financing',¹¹ with particular reference to low income countries. Two complementary reports were presented to the Cannes summit, one by the working group, one by the panel addressing these problems.

The report of the panel and the multilateral development banks' action plan contained some useful analysis of the obstacles to greater private financing of infrastructure projects and some helpful suggestion to overcome these. But the focus of the groups' terms of reference on low income countries, particularly sub-Saharan Africa, was too narrow. While that region undeniably needs better infrastructure, the report highlighted that many African countries currently lack the capacity to develop large projects to a stage where they can attract private finance. In addition, the contribution to growth of infrastructure projects in Africa would likely be less important to global recovery than those in Asia, as low population densities and lower incomes would mean a smaller scale of, and a lower return on, investment. Not only was the focus of the reports too narrow, but the recommendations more relevant to middle-income countries have not yet been implemented, particularly the launch of a global infrastructure benchmarking initiative and improving incentives for staff of development banks to engage in public-private partnerships (PPPs) and develop regional projects.¹²

Independently of the G20, Asian countries have already started to address their infrastructure needs. Regional funds, including the recently launched ASEAN Infrastructure Fund, which has funding of \$485 million a year from ASEAN governments and the ADB, or the Asian Infrastructure Financing Initiative, which brings together several

11. 2010 Seoul multi-year action plan on development.

12. See the 2012 progress report of the G20 Development Working Group.

development banks in the region, are aimed at increasing the funding for regional projects. There are also regional initiatives to increase private funding, notably the ASEAN+3 Bond Market Initiative, a collaborative initiative with the ADB which aims to improve capital markets. The Chinese Asian Infrastructure Investment Bank initiative potentially adds to the pool. These initiatives do not, however, address the distortions or the institutional and regulatory deficiencies which are keeping more private finance from being invested in infrastructure projects. Here, the experience of the developed G20 economies could prove invaluable.

By sharing their policy experience, leaders and policy-makers within the G20 group are equipped to identify and remedy existing failings in regulation and governance as well as distortions in product and factors markets. This will only happen if the G20 concentrates more specifically on infrastructure investment, not as merely one component of a development agenda that will always be sidelined by macroeconomic developments. The G20 needs to recognise the importance of infrastructure as the source of growth, both in the short and medium term, an element in global recovery that cannot be delivered without deep structural reform and which the global economy urgently needs.

4.3 Climate Change

There is another policy-game where the existing international institutional structure has largely failed to coordinate play on Pareto-superior equilibrium, and this is taking policy action to avert climate change. Assuming countries actually want to limit the extent of climate change, all would arguably prefer the outcome in which all mitigate emissions to the one in which no one does. However, because mitigating emissions is costly, countries would be even better off free riding on other countries' efforts to reduce emissions. And since mitigation in one major country is only effective if all or most major countries mitigate their emissions, no country is willing to unilaterally reduce emissions. Thus, the equilibrium is for

no country to mitigate, even if this is Pareto inferior to all mitigating, and climate change mitigation is another prisoners' dilemma-type situation.

Again, the conditions of the Folk Theorem appear to be fulfilled, yet the relevant international institution in this area of policy, the UNFCCC, through the annual conferences of the parties and the negotiation of agreements, has largely proven unsuccessful in coordinating expectations in such a way that the equilibrium shifts from one in which no or few large countries mitigate emissions, to one in which nearly all do so. What limited policies countries have enacted to lower the likelihood of large-scale climate change either by reducing their emissions, as in the case of Europe, or at least the carbon intensity of their economies, as in the case of China, has been the fruit of unilateral action. Yet, as argued above, all countries would probably still prefer a situation in which all major emitters went further in their attempts to reduce emissions of greenhouse gases.

Two points can be made in connection with greenhouse-gas-reduction game. First, as always, it is important to remember which countries are involved in the game. Again, only the policy actions of the largest economies matter in this respect. This is not to deny that the effects of global warming will be most harshly felt in many of the world's smallest and poorest economies. But if the objective is to get major emitters to coordinate a move to low-emissions equilibrium, this will be easier the fewer extra countries are involved. In this respect, the G20, although it has made few concrete statements about reducing greenhouse gas emissions so far, has a major advantage over the UNFCCC, in that the major emitters, and only them, are present in the G20.

Second, any attempt to move to a new high-emissions-reduction equilibrium between the major emitters must make sure that what is proposed is indeed an equilibrium of the repeated game. This requires not only that the commitments of major emitters be specified, but also that credible punishments, to be carried out by the parties to the agreement, be

specified in the event that a country does not meet its commitments. Those devising any such agreement should again look to the operation of the WTO for an example of successful credible punishments.

To be clear, this does not mean that countries engaging in efforts to reduce greenhouse gases now should feel justified in adopting trade sanctions against countries not already taking similar action. However, *once* the countries involved *do* have an agreement about greenhouse-gas reductions, it would be reasonable, even essential, for the agreement to specify what kind of sanctions one party will impose on another in the event the agreement is breached. To lower the likelihood that agreements are breached by accident, it also seems reasonable that any such agreement be focused on inputs to emissions reductions, such as the creation of emissions trading schemes, over which policy-makers have direct control. Agreements that focus on outputs, namely the amount by which emissions are to be reduced, will be more subject to chance variations in external conditions in determining whether they are satisfied or not. Focusing on outputs was a flaw of the Kyoto protocol, which led for example to Japan's withdrawing from the protocol, in part because a natural disaster, leading to the abandonment of nuclear power, made it impossible for that country to meet its targets.

5. Conclusion: The G20 in Future

While the activities and objectives of the G20, and international institutions in general, are often debated in both academic circles and non-academic circles, no previous effort has been made to relate international institutions to the existing economic theory of institutions. This essay has attempted to address this by applying the game-theoretical analysis of institutions to the international institutional architecture.

This approach has focused the attention on primitive policy-making games. In these repeated games, the Folk Theorem guarantees, under certain conditions, that Pareto optimal equilibria exist and may be supported by strat-

egies that punish defections. Throughout the article, we study, without pretension of exhaustiveness, three policy-making games: trade policy, macroeconomic policy and climate policy.

In each of these areas of policy-making, we have identified an international institution that attempts to coordinate expectations of policy-makers around Pareto-efficient equilibria: WTO in the case of trade, IMF for macroeconomic policy and the UNFCCC for climate change. In carrying out this analysis, the importance and difficulty of finding acceptable punishment strategies has been highlighted, particularly in the macroeconomic policy-making and climate change games.

In each of these games, the economic rise of Asia is a shock to the games previously only played between the advanced economies. These new players to the game have not always accepted the equilibria on which existing international institutions have until now attempted to coordinate expectations. The formation of the G20 can be seen at least in part as a response to this.

The formation of the G20 represents a major achievement, perhaps even the most important achievement of international diplomacy in recent times. The focus of the G20 to date has been almost exclusively on domestic economic policy; countries have brought forward and debated each other's policies. They have examined them through the lens of their policies' effects on growth and employment in other countries before reaching decisions and then, in a spirit of mutually beneficial cooperation, followed up those decisions with independent action. This domestic focus, and this *modus operandi*—where countries agree on domestic policies but the responsibility for implementing them lies exclusively with the respective countries—is part of the strength of the G20. The alternative, to expect the G20 countries to bind themselves to a grand bargain which will solve all the international problems of the day, would only lead to stalemate and deadlock.

Beyond immediate domestic policy coordination and crisis management, there is still a need to address the entrance of new countries

in policy-making games previously only played between established industrial countries. This will require either involving them in the current equilibria of the game, quintessentially represented by the WTO system of trade liberalisation, or finding ways to collectively coordinate on new equilibria. The main strength of the G20 is that it brings together the new and old participants in the coordination games analysed, and only them, and therefore offers them an opportunity to agree on how best to use and adapt the international institutional architecture to coordinate on Pareto-optimal equilibria.

The emerging Asian economies have benefited enormously from the existing rules of the game, but, as their importance continues to grow over the coming years and decades, they must be better included in the international rules-setting organisations. The emergence of new issues that affect the structure of the games through welfare-improving equilibria is another element that has highlighted the limitations of the existing regime. The creation of the G20 has begun to address both these shocks to the global economic system, and that is why it represents such an important change in global governance. But the process of adjusting the division of international power to better reflect international economic weight has only begun, and many important reforms to international institutions remain to be done.

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